

and Paria, and thus the Sea of Carúpano was formed. That the South American mainland extended before this catastrophe as far as Grenada, Tobago, and Trinidad, is sufficiently proved by the investigations of Mr. Bland on the land shell fauna of the West Indies, and is moreover corroborated by the comparative shallowness of the sea between the coast of Venezuela and the islands mentioned. Tobago is still within the 100-fathom line, and a rise of the sea-bottom of no more than 400 fathoms would be sufficient to re-establish the terrestrial connection with Grenada.¹

It is self-evident that an immense quantity of organic matter must have been buried with the sunken land. This organic matter contributes to the formation of sulphuretted hydrogen, and is the stratum which feeds the submarine petroleum springs on the coast of Barcelona; whilst in those parts which afterwards were again lifted above the surface of the sea, it appears in the extensive deposits of asphalt known in Trinidad and Maturin, and performs an active part in the generation of the sulphurous vapours of the *azufrales*.

If we consider what a large quantity of fish-remains must gradually accumulate in the shallow waters on the coast of Carúpano, where they are slowly covered by successive layers of finely-sifted sediment, we are enabled to understand how other deposits of a similar character, for instance, that of Monte Bolca, have been formed in bygone ages; indeed, Carúpano will, in time, be another Monte Bolca to the palaeontologist of the Coming Race.

Caracas University, October 22

A. ERNST

KILIMA-NJARO²

THE rapid progress of African exploration during the last quarter of a century is strikingly exemplified in the brief history of the monarch of African Mountains. Doubtfully alluded to as the "Ethiopian Mount Olympus" by Enciso in the sixteenth century, and absolutely unknown to science before its discovery by Rebmann in 1848, it has already since that year been several times visited, partly explored, and even ascended to heights of 10,000 and 14,000 feet by Baron von der Decken in 1861-62, by the Rev. Charles New in 1871, and by Mr. Joseph Thomson on his memorable journey "Through Masai Land" in 1883. And the work of these pioneers has now been all but completed by Mr. Johnston, who was early in 1884 specially commissioned by the Royal Society and the British Association to study the interesting fauna and flora of the Kilima-Njaro uplands. During the six months from May to October of that year, passed by him on their southern and eastern slopes, this experienced African traveller has succeeded under great difficulty in collecting abundant materials for illustrating the natural history and physical constitution of the "Mountain of the Snow Fiend," as its euphonious Ki-Swahili name is interpreted. These results are embodied in the work before us, which is alike admirable for its bright and graphic style, and the judicious arrangement of its varied contents. By the simple plan, consistently adhered to throughout, of treating the narrative portion separately, and confining the strictly scientific matter to the concluding chapters, all tastes are consulted, and the common mistake is avoided of sacrificing the interests of the student to those of the general reader.

The few months to which the expedition was limited were passed partly at the station of Kitimbiri in the Moshi territory ruled over by King Mandara, partly in the more easterly district of Marangu. Both of these tracts are included in the Chaga country, which occupies

all the southern slope, which however, as now appears, does not constitute a single kingdom under Mandara, but comprises a considerable number of petty Bantu States, mostly mutually hostile, and seldom combining except to resist the attacks of the common Masai enemy. Mandara, who had hitherto figured in the history of recent East African exploration as a doughty warrior scarcely second in importance to Mirambo himself, thus sinks to the position of a mere triton amongst the minnows, though still powerful enough to be troublesome, and enjoying a somewhat widespread reputation, if not for personal courage, at least for political sagacity.

As shown in the annexed cut (Fig. 1) the aspect of Kilima-Njaro seen from above Moshi is that of a single snow-capped dome towering to a height of nearly 19,000 feet above the bare or grassy upper slopes, and clothed lower down with a dense and varied tropical vegetation. But when viewed from Lake Jipé, a point lying nearer its base towards the south-east, it appears in its true character of a double-crested snowy mass, in this as in some other respects presenting a remarkable resemblance to the Armenian Ararat. Mr. Johnston, who made two ascents, first from Moshi to a height of 9000 feet, and again from Marangu to about the normal snow-line (16,315 feet, or within a little more than 2000 of the summit), calculated the altitudes of the two peaks, Kibô and Kimawenzi, at 18,800 and 16,250 feet respectively. This only slightly exceeds von der Decken's estimate, who assigns 18,700 feet to Kibô, so that the absolute altitude of the probable culminating point of the continent may be taken at somewhat under 19,000. On the lofty connecting ridge clumps of forest were found still straggling up to 10,000 feet. Many bright-coloured flowers also grew up to this altitude, "notably a vivid blue *cynoglossum* (houndstongue), mauve and blue irises, and pink, waxy-white, and yellow everlasting. Tufts of *artemisia* (southernwood) grew in sheltered places. There were many heaths, a small kind of *geranium*, huge *proteas*, and divers ferns and mosses" (p. 235). Even at 12,600 feet strange sessile thistles were met, nearly five feet in circumference, besides an extraordinary *lobelia* (*L. Deckeni*) three to four feet in height, and a very characteristic arborescent plant new to science, and since named *Senecio Johnstoni* (Fig. 2), "looking somewhat like a banana in the distance, but in reality consisting of a tall, black, smooth trunk, 20 to 30 feet in height, and surmounted by a huge crown of broad leaves interspersed or headed up with bunches of yellow blossom. The strange composite grew abundantly in the streamlet's bed, and its trunk was so superficially rooted that, in spite of its height and girth, I could pull it down with one hand" (p. 268).

Beyond 13,000 feet vegetation became stunted and patchy, ceasing altogether about the altitude of 15,000 feet. The last resident bird, a kind of stone-chat (*Pinarochroa hypospodia*) was met in flocks, and showing a total absence of fear, up to 13,700 feet, beyond which no bird was seen except a rare high soaring kite, or great-billed raven. Yet such large game as the elephant, buffalo, and antelope are pursued by the natives up to altitudes of 12,000 and 13,000 feet, and captured chiefly by pitfalls. In the Bura district, east of Kilima-Njaro, the *Alcelaphus cokii*, a species of hartebeest, or tall red antelope, was seen associated by a sort of unconscious symbiosis with tall red ant-hills, and deriving some protection from their almost ludicrous resemblance to these objects. "Being a deep red-brown colour, and standing one by one stock-still at the approach of the caravan, it was really most difficult and puzzling sometimes to know which was antelope and which was ant-hill; for the long grass hiding the animal's legs left merely a red-humped mass, which until it moved, might well be the mound of red earth constructed by the white termites. The unconscious mimicry was rendered the

¹ See the chart quoted in the first note.

² "The Kilima-Njaro Expedition, a Record of Scientific Exploration in Eastern Equatorial Africa." By H. H. Johnston, F.Z.S. (London: Kegan Paul, 1886.)

more ludicrously exact sometimes by the sharply-pointed, flag-like leaves of a kind of squill—a liliaceous plant—which frequently crowned the summit of the ant-hill or grew at its base, thus suggesting the horns of an antelope either with the head erect or browsing low down. The assimilation cannot have been fancied on my part, for it deceived even the sharp eyes of my men ; and again and again a hartebeest would start into motion at twenty

yards' distance and gallop off, while I was patiently stalking an ant-hill, and crawling on my stomach through thorns and aloes, only to find the supposed antelope an irregular mass of red clay" (p. 66).

Amongst the valuable animal specimens secured by our naturalist was one of the new and beautiful species of *Colobus* (*C. guereza*, Rüpp., var. *caudatus*, var. nov., Fig. 4) first seen and described by Mr. Thomson, which

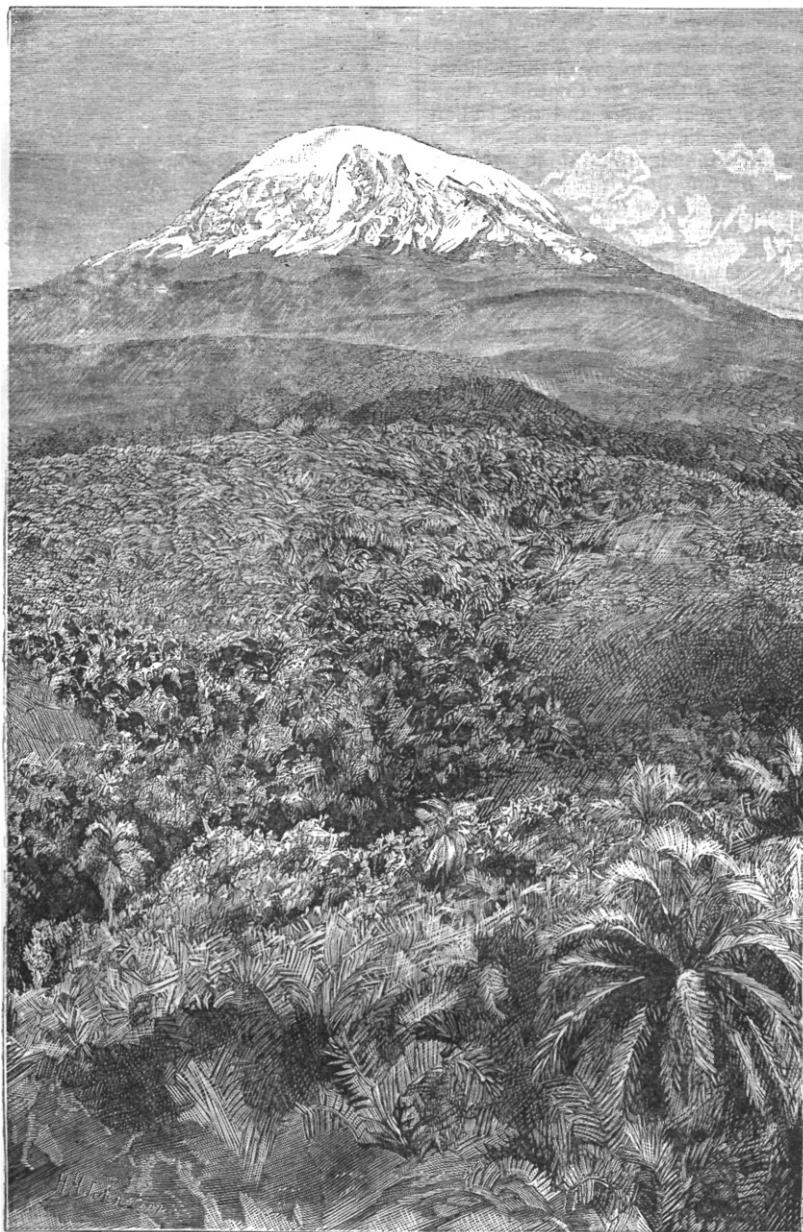


FIG. 1.—Kilima-Njaro seen from above Moshi ("Palms and Snow").

frequents the base of Kilima-Njaro, and is apparently restricted to that region. Mr. Oldfield Thomas, who contributes an important paper on the mammals obtained during the expedition, tells us that it is "characterised by having the white brush of the tail very much larger and finer than is the case in the true Abyssinian *C. guereza*. . . . The hairs of the white body-mantle, entirely cover the black fat the base of the tail, the white of the

latter and of the mantle being quite continuous" (p. 388).

Besides this paper by Mr. Thomas the work is enriched with several others by specialists, such as Prof. Bonney, who deals with a collection of rocks (mainly igneous) from the higher regions of Kilima-Njaro ; Prof. Oliver and Mr. J. G. Baker, to whom botanists will be grateful for a careful enumeration of all the plants collected during

the expedition ; Mr. F. D. Godman who classifies sixty-one specimens of Lepidoptera, including at least three new species ; Charles O. Waterhouse, by whom examples of fifty-six Coleoptera are similarly treated ; Captain G. E. Shelley, who jointly with the author gives a descriptive catalogue of fifty species of birds, of which six are new to science, collected or observed in the district ; Mr. E. J. Miers, who describes a new variety of river-crab of the genus *Thelphusa* doubtfully assigned to the species *T. depressa*, Krauss.

But of all the scientific papers by far the most important are the two chapters contributed by Mr. Johnston himself on the anthropology and philology of the Kilima-Njaro district, or rather of all the East Central African region lying between the great lakes and the Indian Ocean. Measured by a pecuniary standard, it is not too much to say that these two monographs alone are fully worth the 1000*l.* granted by the British Association and Royal Society for the purposes of the expedition. Besides a graphic account of the Bantu and Masai peoples, whose respective domains are conterminous, or overlap each other in this part of the continent, we have here a general disquisition on their mutual ethnical and linguistic



FIG. 2.—*Senecio Johnstonii*.

relations, which fills up at least one great gap in the field of African anthropology. The mystery hitherto surrounding the Masai race is at last largely dissipated, and we are now enabled with some confidence to assign them their true place in the African family. A careful comparative study of their language and physical type clearly shows that their affinities are to be sought amongst the Negro or Negroid peoples of the White Nile, and more particularly the warlike Bari nation of the Gondokoro district. From this basin they appear to have gradually spread in comparatively recent times south-eastwards between the Victoria Nyanza and the coast, encroaching to the east on the Hamitic Gallas, to the south on the Wa-taita, the Wa-chaga, and other outlying branches of the Bantu family. The annexed graphic illustration of a Masai warrior (Fig. 3) betrays some unmistakable Negro features, especially in the short nose, broad nostrils, and thick lips standing wide apart. On the other hand, the close relationship of the Masai and Bari languages is here clearly established, one of the most striking features common to both being true grammatical gender, as indeed had already been pointed out by Lepsius in his Nubian Grammar. Masai must consequently now be separated

from the Nuba group, as the Nuba has already been separated from the Fulah of Western Sudan ; and thus there is at last an end of Friedrich Müller's "Nuba-Fulah family," which has hitherto figured so largely in treatises on African philology. Its place is taken in East Central Africa by the Bari-Masai group, which Mr. Johnston now proposes to constitute, and which includes, as intervening members, Latuka certainly, Lango, Sük, and Samburu more doubtfully.



FIG. 3.—A Masai Warrior.

It will be seen that the rich linguistic data here brought together cannot be neglected by the future student of African philology. The patience and ingenuity expended in the collection of this material is aptly illustrated in the account given of a hunt after a single grammatical element of the Ki-Chaga language current throughout the southern districts of Kilima-Njaro. The object is to determine the exact form of the eighth pronominal prefix

(a plural one), of which fifteen altogether are represented in this member of the Bantu family. But "unfortunately I cannot ask any of my friends, 'What is your eighth prefix?' I should never be understood if I explained for a hundred years. I have to get at it in some other way. 'What is this?' I ask, holding up a knife. 'Ki-oshō,' they reply. 'Just so,' I replied; 'ki' is the seventh prefix, and the plural must give the form of the eighth. 'How do you say many knives?' I continue; 'ki-oshō is *one*; what is many?' 'Shingi' (many), they reply. 'No, but many knives?' 'Shingi' is again repeated. Then I ask, 'See, this is one knife—*ki-oshō kino* (holding up one finger). What is for *two knives*?' (holding up two fingers). 'Two fingers,' they reply, looking up very much puzzled. Then in despair I send for another knife, and placing it

beside the original one, again ply them with a question. This only elicits the word for 'another'; but at length after many disappointments they are induced to say *shi-oshō shivi* (*two knives*), which gives me *shi-oshō* as the plural of *ki-oshō*, and consequently *shi* is the form of the eighth prefix, and so on" (p. 162). Of course all travellers amongst the lower races are familiar with difficulties of this sort. But it is not every traveller who during the off hours of a six months' expedition contrives to collect sufficient linguistic materials to reconstitute the philology of a continent.

Mr. Johnston, who is also an accomplished artist, has added much to the value of his work by the numerous illustrations with which he has enriched this handsome volume. His skill especially in portraying animal and



FIG. 4.—*Colobus guereza*, var. *caudatus*.

vegetable forms is sufficiently attested by the specimens here adduced. He also supplies a copious index, as well as carefully prepared route and linguistic charts, besides a large map brought well up to date of Eastern Equatorial Africa between the parallels of 1° N. and 6° S. It remains to be stated that in this notice the somewhat unfamiliar orthographic system of Lepsius, adopted by the author, has been replaced by the usual and sufficiently accurate method adhered to by Stanley, Thomson, and most other English travellers in Central Africa. To the writer it seems that the plan of combining the English consonantal with the Italian vocalic system adapts itself fairly well to the transliteration of most African (Negro) and especially of the Bantu languages.

A. H. KEANE

NOTES

LORD ROSEBURY has endowed a new lectureship in the University of Edinburgh. The course, which will extend over five years, will consist of thirty lectures on the Philosophy of Natural History. The lectureship has been offered to, and accepted by, Mr. G. J. Romanes, M.A., LL.D., F.R.S. This is the second lectureship which has recently been founded in connection with the Chair of Natural History. The other one is on Comparative Embryology, and is occupied by Mr. G. Brook, F.L.S.

AN important discovery has been made by Dr. O. Tumlitz, of Prague. Hitherto no substance amongst those which exhibit diamagnetic properties has been observed to possess any per-